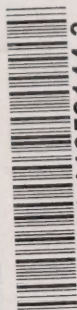


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TECHNOLOGY ONTARIO

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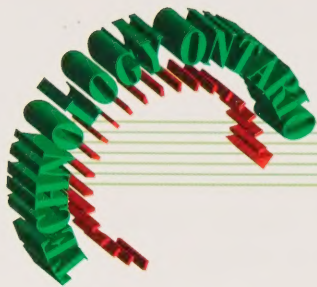


1992/1993
annual report
enclosed



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recognizing the challenge

In today's dynamic marketplace, developing the right technology at the right time can be key to growth and prosperity.

But as most business people and scientists know, this challenge is not without complexity. Knowledge, contacts and support can make a world of difference – especially when developing new ideas or bringing new products to markets.

Creating the needed linkages, adding value, expanding skills and encouraging new technology and technology transfer are distinct and demanding tasks, but it is when combined that they best leverage competitive advantage and extend global reach.

and business people. Workers and technical trainers.

Through such partnerships, we actively support most aspects of technology research, development, and transfer in Ontario. In so doing, we are working hard to help create and sustain those Ontario industries which are knowledge-based and globally driven.

raising awareness

This booklet has been designed to give you the facts about Technology Ontario – who we are, what we do, how and why we work on your behalf, where you can find out more...

We want you to gain a better idea of the opportunities we provide for technology assistance and how we support technology development in Ontario.

By encouraging such awareness, we underline our commitment to work with Ontarians toward a productive and prosperous future. ■



S YMBOLS:



ENVIRONMENT



SCIENCE INSTRUMENTS



BIOTECHNOLOGY



MANUFACTURING



MATERIALS



TELECOMMUNICATIONS



INFORMATION TECHNOLOGY



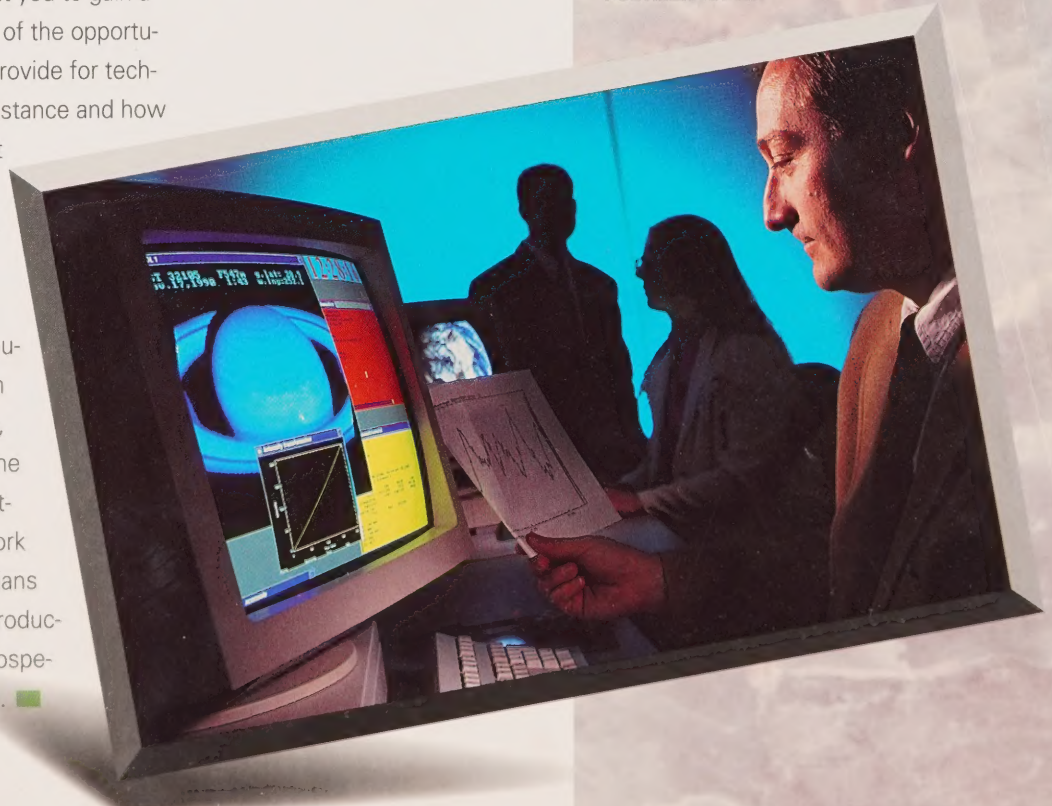
IMAGE ANALYSIS
REVEALS THE

INTENSITY AND VARIATIONS OF SATURN'S
ATMOSPHERE COMPOSED OF HYDROGEN,
AMMONIA ICE CLOUDS,
AND HIGH-ALTITUDE
POLYMER HAZE.

answering the need

Technology Ontario has been created to promote and achieve this type of synergy – the synergy which results from consolidating expertise, enhancing capabilities and capitalizing on experience.

At Technology Ontario, a large part of our role involves investing in partnerships. Between universities and industry. Researchers



International Research and Development Agreements Ortech International
The University Research Incentive Fund The Technology Adjustment Research Program
The Technical Personnel Program
The Industry Research Program
The Ontario Centres of Excellence
who we are what we do how we do it

who We are

Technology Ontario is a branch of the Ontario Government's Ministry of Economic Development and Trade. Technology Ontario, formerly the Ontario Technology Fund, was created in 1986 by the Premier's Council. Today, Technology Ontario still maintains close contact with the Premier's Council on Economic Renewal.

why we work with others

Technology Ontario was set up to accelerate the pace of innovative R&D within Ontario's economy. The Ontario Government

continues to see this type of innovation, and the growing role of technology in the workplace, as crucial factors in the province's sustained prosperity.

Since Technology Ontario started, thousands of people have been involved – from industry, academia, labour, and all levels of government – in our evolution, and many more have benefitted from our programs.

The results are tangible. Our programs have led to:

- new products
- new services
- new patents and licences
- expanded export sales and global opportunities
- international cooperative R&D ventures

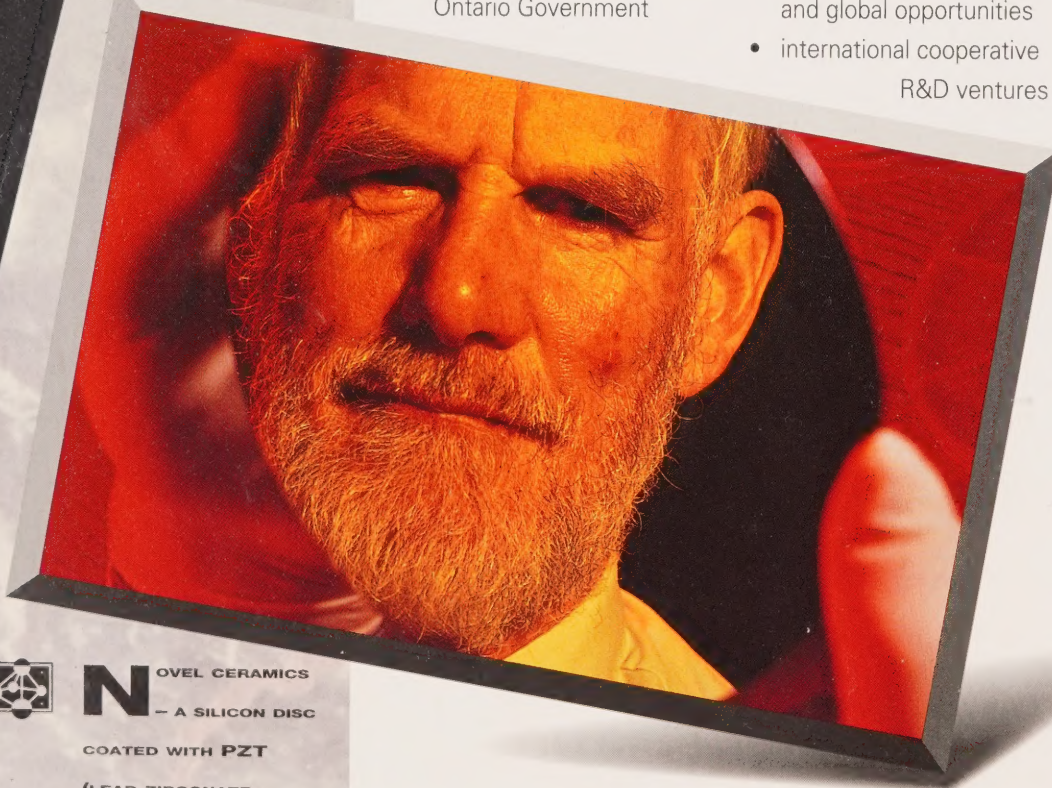
- new R&D alliances between industry and academia
- new technical skills for workers
- the hiring of new technical personnel for small and medium-sized companies.

how we strengthen Ontario's industrial policy

Technology Ontario helps strengthen government efforts to achieve a competitive industrial base and a technically skilled workforce. As such, we are an important instrument in the Ontario Government's industrial strategy.

Technology Ontario represents a major financial commitment by the Ontario Government to technology development and diffusion. We underline the critical role a government can play in encouraging greater private sector research and development, while coordinating and focusing R&D investment.

In addition to directly funding strategic R&D ventures, Technology Ontario also manages several of the Ministry's investments in research and development. More recently we have been assisting other ministries in the evaluation and management of their R&D investments. ■



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MUNICATIONS TO INFEC-

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BIOMATERIALS.

what we do

Technology Ontario is committed to developing and maintaining Ontario's strong leadership in science and technology through research and development.

This province has some of the best researchers in the world working in its educational institutions and scientific laboratories. Ontario industry also has the entrepreneurial skills and business know-how to compete in the world marketplace.

Leveraging these advantages is a key part of what Technology Ontario does. By linking R&D innovation with business capability, we help to provide real opportunities for economic growth.

to support industry and business

Technology Ontario actively supports seven key technologies. These are seen as strategically important to the success of Ontario's industrial and business sectors.

They are:

- manufacturing technology
- information technology
- telecommunications
- materials research
- environmental technology
- laser and optics technology
- biotechnology.

Each of these technologies – whether it involves process improvements for industry, advances in health care, or support for “green industries” – has an integral role in Ontario's future.

and achieve our goals

Technology Ontario's goals are to:

- enhance linkages between industry, labour, universities and government in scientific areas of strategic importance to Ontario;
- increase the development and export of advanced higher value products and services;
- expand the market within Ontario industry and the research community for people with advanced technical skills and

research capabilities, while encouraging more students to pursue research careers; and

- strengthen public awareness and understanding of the importance of science and technology in wealth creation, and its ability to support the social services important to our standard of living. ■

how we do it

Technology Ontario is composed of several innovative programs and international R&D agreements.

In essence, these programs and agreements help “deliver” the ways and means for Ontario to invest in technology development, increase its technical skills, and transfer new technology to market. ■



THE BIOMOLE-
CULAR MASS
ANALYSER, THE API III,
IS A NEW TECHNOLOGY
BREAKTHROUGH IN THE
FIELD OF MASS SPEC-
TROMETRY FOR THE
ANALYSIS OF PROTEINS,
NUCLEOTIDES AND
OTHER BIOPOLYMERS
FOR BIOMEDICAL
RESEARCH.

who we are

what we do

how we do it

International Research and Development Agreements Ortech International
The University Research Incentive Fund The Technology Adjustment Research Program
The Technical Personnel Program
The Ontario Centres of Excellence

our programs

The Industry Research Program (IRP)

stimulates collaborative research, development, and technology applications in Ontario industries, universities, and research institutes.

The program's key elements:

- IRP will provide up to 50 per cent of the eligible costs of research projects which involve at least two collaborators
- Research, development and manufacturing for all IRP projects must be carried out within Ontario
- Products must have export potential

- Products must contribute to skills training and job creation
- IRP projects cover a broad spectrum, from manufacturing processes and electro-optics technology to environmental and biomedical research initiatives.

Eligible applicants:

- Canadian controlled corporations or subsidiaries of foreign-owned firms which have research and manufacturing operations in Ontario
- Crown corporations, with an arms-length relationship with government, receiving less than 50 per cent of their revenue from government

- Research organizations and consortia with more than 50 per cent of operating funds from private sources

- Ontario post-secondary institutions
- Ministries of the Ontario Government.

(Some exceptions to these criteria apply; also crown corporations and government laboratories may be subcontractors to, or participate in, projects but will not receive direct assistance.)

Eligible projects:

- Research projects which would normally run for a minimum of two years to a maximum of five years, and include the following:
 - Leading edge science and technology
 - Potential economic benefit to Ontario
 - Export development or import replacement
 - Collaborative aspects with other companies and academia
 - Human resource development.



VG ISOGAS
PRISM II

STABLE ISOTOPE RATIO
MASS SPECTROMETER,
ANALYSING CARBONATE
SAMPLES FOR CARBON
AND OXYGEN ISOTOPE
RATIOS.



The University Research Incentive Fund The Technology Adjustment Research Program

The Technical Personnel Program

The Ontario Centres of Excellence

The Industry Research Program



The Ontario Centres of Excellence

were launched in 1987 to advance scientific knowledge and technical innovation through R&D. By providing a focal point for research in crucial disciplines, these seven centres, supported by Technology Ontario, also successfully encourage the transfer and diffusion of technology through the economy.

The program's key elements:

- The Centres transcend usual institutional boundaries. They comprise a network of the best researchers from university, government and industry research units already renowned for international excellence who collaborate on projects of strategic importance to Ontario
- By creating a core of scientific capability, the Centres provide Ontario

universities and industries with a window on essential global technological advances

- Their areas of research involve leading-edge fields of science of potential economic benefit to Ontario
- They train graduate students, most of whom find employment in Canadian industry.

There are seven centres:

- **The Information Technology Research Centre (ITRC)** promotes fundamental and applied research which spans the breadth of leading edge information technology including artificial intelligence and computer networks. It also develops ways to effectively transfer the results of enabling technology research to Ontario industry.

- **The Manufacturing Research Corporation of Ontario (MRCO)** promotes Ontario's industrial competitiveness through programs which stimulate world-class, industrially-relevant, academic research in such areas as metal processing and production systems. It also works to enhance industry awareness of the benefits of research commercialization, while developing mechanisms to facilitate technology transfer to manufacturers.

- **The Ontario Centre for Materials Research (OCMR)** strives for leadership in the development of materials knowledge and related research to industry. Program areas involve polymers and plastics, metals and ceramics, electronic and optoelectronic materials and new materials.

MAX SOLIDO®
SINGLE ROTOR, DUAL
STRIP 3D PROJECTOR,
IMAX SOLIDO®
ELECTRONIC LIQUID
CRYSTAL ALTERNATE
EYE 3D GLASSES AND
THE DUAL STRIP
IMAX®3D CAMERA -
3-D MOTION PICTURE
SYSTEM.





COMPUTER PRE-
DICTION OF THE
FORMING SEVERITY FOR
AN ENGINE OIL PAN.



■ **The Ontario Laser and Lightwave Research Centre (OLLRC)**

performs advanced research in areas such as biomedical applications of lasers and photonic science. It also works to encourage the technical application of such research and train world-class researchers. Through a research facility comprised of the most modern lasers available, it enables industry to do research on equipment not normally available in small to medium-sized companies.

■ **The Telecommunications Research Institute of Ontario (TRIO)**

enhances the technological competitiveness of Canadian telecommunications companies by conducting research in areas such as enterprise networks and mobile and satellite systems. University and industry partnerships focus on shared research ventures, which are led by the best researchers in the province. TRIO also operates an innovative technology transfer program.

■ **The Institute for Space and Terrestrial Science (ISTS)**

is an academic and business consortium which is focused on space and environmental sciences. It provides leadership in key areas of multidisciplinary space and terrestrial science and engineering such as remote sensing.

■ **The Waterloo Centre for Groundwater Research (WCGR)**

pursues a fundamental understanding of the processes which govern the occurrence and quality of groundwater resources, and then seeks to apply this understanding to the development and protection of such resources. It also promotes the Ontario advanced technology groundwater industry, and fosters international awareness of Ontario and Canadian groundwater technology and expertise.

The Technical Personnel Program (TPP)

is dedicated to helping smaller Ontario businesses meet their needs for technical staff. Technically capable employees in smaller companies are crucial to Ontario's overall competitiveness and productivity – particularly, given that small businesses today lead the economy for growth and job creation. The program is managed by the Small Business and Domestic Operations Branch of the Ministry of Economic Development and Trade.

Rationale for the program:

- In Ontario, more than 70 per cent of small and medium-sized manufacturers do not employ full-time scientists or engineers
- TPP was introduced in 1989 to assist small and medium-sized manufacturers to raise the level of technical skills, cut manufacturing costs, boost productivity and provide new opportunities for export.

How the program works:

- Through contributions to wages, TPP enables each eligible company to hire up to two new technical staff members

■ TPP will contribute 50 per cent of a new technical employee's salary for the first year, set at a maximum salary of \$60,000 annually, and 25 per cent the following year

■ Prospective employees must be Canadian citizens or landed immigrants with a scientific, engineering, or technical degree or diploma from a recognized university or college.

Eligible applicants:

- Incorporated manufacturing or service companies, which are at least two-years-old and have 10 to 200 employees (retail companies are not eligible)
- Companies that now export or have plans to export goods or services

■ Companies that have a financially sustainable engineering or scientific project under development, that will improve competitiveness by enhancing products or services, capital equipment, systems, or technical expertise

■ Companies that lack scientific or technical personnel and have not received funds for their research project under any other Technology Ontario program

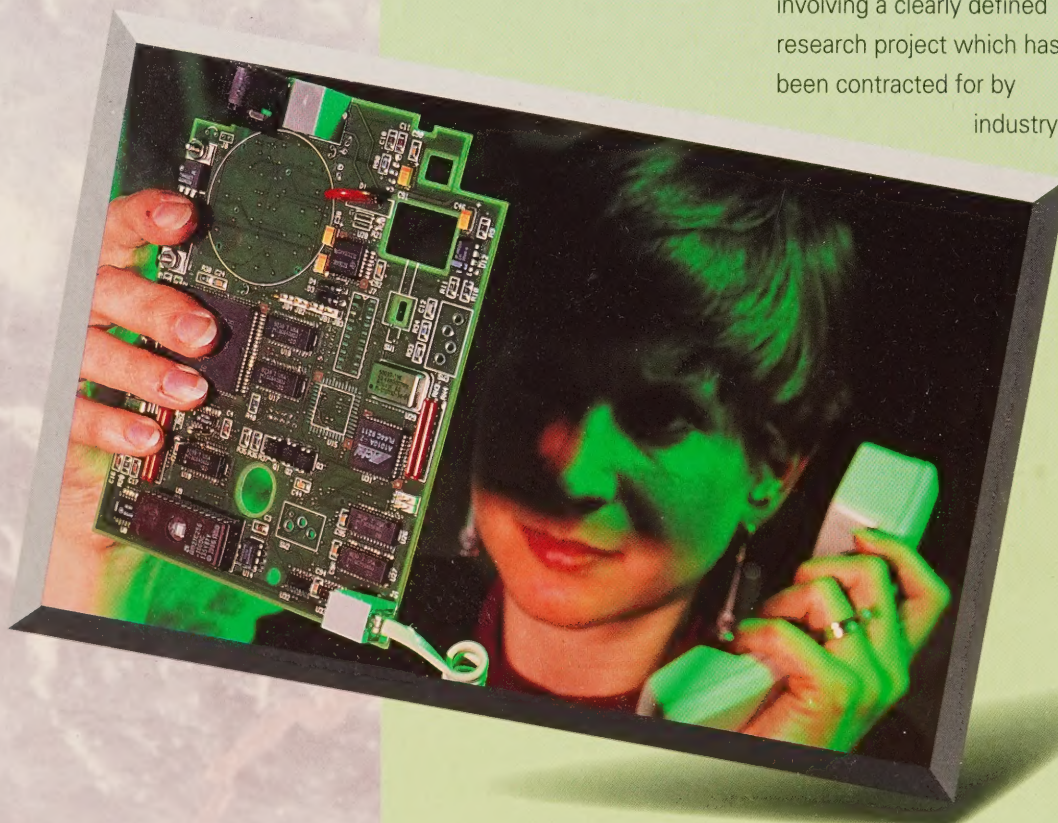
■ Companies which carry out their strategic planning, financing, marketing, R&D, manufacturing, product design, and head office functions from an Ontario base.



DEVELOPMENT OF
NOVEL POLY-
VINYL CHLORIDE FOR-
MULATIONS USED IN
THE TECHNOLOGY TO
DEVELOP A MODULAR
"PVC" PLASTIC
HOUSE.



THE VOICE/DATA
DIGITAL
TELEPHONE.



The University Research Incentive Fund (URIF)

was established to encourage universities and the private sector to enter into co-operative research ventures. It is managed by the Ontario Ministry of Education and Training.

The program's key elements:

■ URIF will match private sector investments in university research, dollar for dollar, up to a maximum of \$200,000

■ Three competitions for funding are held annually. Proposals are evaluated by a selection committee with representatives from industry, academia, and government

■ Funds allow universities to hire non-tenure faculty, as well as graduate and post-doctoral students, to work on research initiatives for a three-year period. Funding can also be applied to new technical equipment purchases.

Eligible applicants:

■ Any Ontario university can submit a proposal involving a clearly defined research project which has been contracted for by industry

■ Corporate partners must be Canadian corporations or subsidiaries of foreign-owned firms operating in Ontario, industry-sponsored research organizations and consortia, or crown corporations with an arm's length relationship with government.

Eligible projects:

■ New research projects or an identifiable new phase of an ongoing research venture

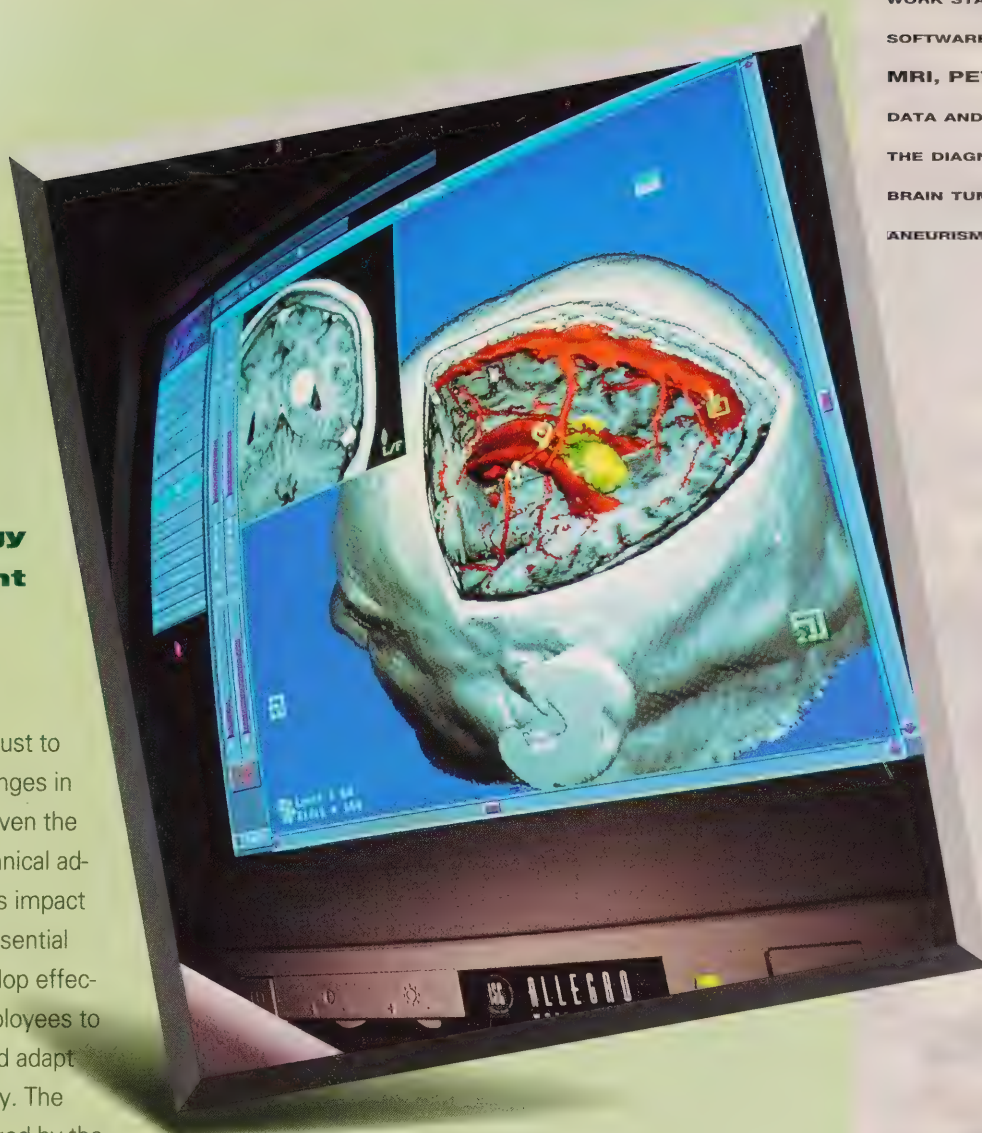
■ Basic or applied research projects, including those aimed at improving production and manufacturing processes (clinical trials and routine testing are not eligible)

■ In some cases, preliminary and feasibility studies are eligible for projects involving smaller private sector organizations

■ The total corporate contribution (cash and in-kind) for all projects other than feasibility studies must not be less than \$10,000.

3D MEDICAL IMAGING

WORK STATION. THE SOFTWARE ENHANCES MRI, PET AND CAT DATA AND IS USED FOR THE DIAGNOSIS OF BRAIN TUMOURS AND ANEURISMS.



The Technology Adjustment Research Program (TARP)

helps workers adjust to technological changes in the workplace. Given the rapid pace of technical advancement and its impact on people, it is essential that Ontario develop effective ways for employees to accommodate and adapt to new technology. The program is managed by the Ontario Federation of Labour.

The program's key elements:

■ TARP undertakes research projects which examine both the short- and long-term impacts of new technologies, training and other work organization initiatives

■ Funds are distributed via the Ontario Federation of Labour to specific research projects, including those in the automotive, steel fabrication, pulp and paper, apparel and electronics industry

■ To date, research work has included electronic measurements of work performance in airline reservations and attitudes toward training among workers in the electrical and electronics sector.



DEVELOPMENT OF
SOFTWARE AND
SENSING SYSTEMS THAT
WILL ALLOW FOR THE
AUTONOMOUS MOVE-
MENT OF A ROBOT IN A
KNOWN ENVIRONMENT.

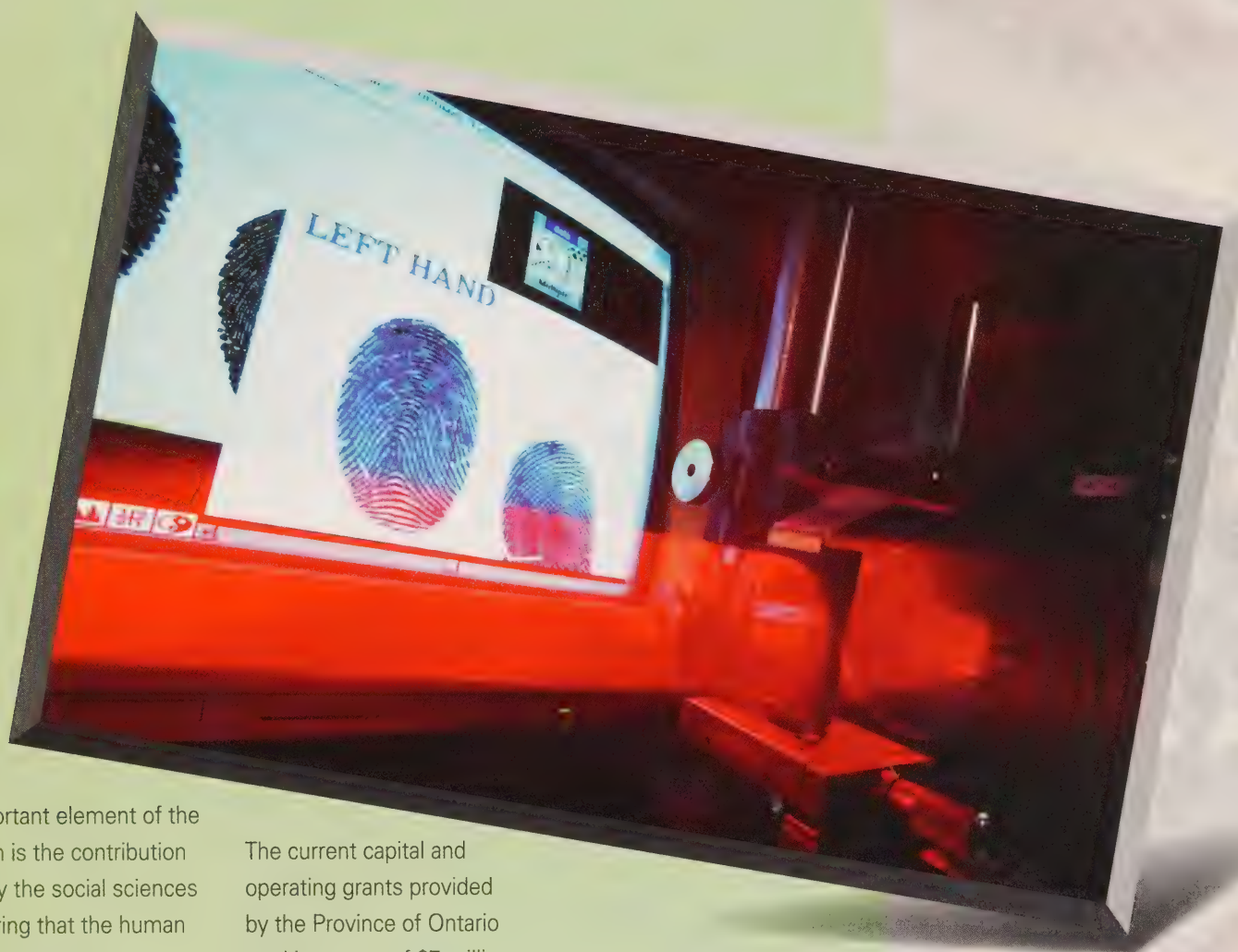
International Research and Development Agreements

have been established between the Ontario Government and regional governments in Baden-Württemberg, Germany; Rhône-Alpes, France and Catalunya, Spain. These regions, with Lombardia, Italy, are collectively known as the "Four Motors for Europe" for their potential to drive economic growth in their respective countries.

The key elements:

- International R&D agreements help Ontario build its international capabilities through the sharing of scientific and research expertise
- As well as benefitting each region, these R&D efforts boost Ontario industry's attainment of international standards, while fostering greater understanding of export opportunities and business culture in other countries
- Collaborative funding for research projects extends to such strategic areas as laser development, local area network integration, biomaterials and medical imaging
- Telepresence – a key project – involves both academic and industry researchers in the development of a common software platform for multimedia telecommunications. This software, which potentially could be used on any computer in Europe and North America, has promising applications for long distance video conferencing, hospital management, long distance education, manufacturing and other fields.





An important element of the program is the contribution made by the social sciences in ensuring that the human factors are taken into account when designing the technical base.

Ortech International

Ortech International is Ontario's provincial research organization. It provides, for a fee, technical consulting services and conducts and manages research and development projects for Ontario industry.

The current capital and operating grants provided by the Province of Ontario total in excess of \$7 million. This financial support assists Ortech International with maintenance of the quality of its technical capabilities and its ability to meet the ongoing technical needs of both Ontario and international industrial clients. ■

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OPTICAL
FINGERPRINT ACCESS
CONTROL DEVICE TO
VERIFY IDENTITY.





where to learn more

Got questions? Need more specific information? Do you want to know how certain technologies are being researched and developed for the future?

At Technology Ontario, we're happy to provide you with more information, to answer your questions, and direct you to the right person with the right details to meet your needs.

Please call or write:

Technology Ontario
Ministry of Economic
Development and Trade
56 Wellesley Street West,
15th Floor
Toronto, Ontario
M7A 2E7

Phone: (416) 314-8220

Fax: (416) 314-8224

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TECHNOLOGY ONTARIO

Annual

1992

1993

Review

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A message from

Peter Barnes, Deputy Minister

**Ministry of Economic Development
and Trade**

Innovative research and development is vital to our economy and quality of life. Scientific and engineering advances propel industries to success, stimulate business growth and allow communities to share more widely in economic renewal.

The Ontario Government is committed to ensuring that effective R&D fulfils this expectation within Ontario, and recognizes that the public sector can play a meaningful role in fostering valuable R&D partnerships.

This role is reflected in the work of **Technology Ontario**. Through successful R&D programs and international R&D agreements, **Technology Ontario** is helping to boost Ontario's productivity and ensuring its competitive advantage.

Technology Ontario is strengthening Ontario's industrial base by creating R&D linkages among universities, industry, research laboratories, workers, trainers and government. By enhancing technical capabilities and supporting global marketing efforts, **Technology Ontario** is helping to create new opportunities for sustained prosperity.

In the past year, the Ontario Government renewed its commitment to **Technology Ontario**. In doing so, it underlined its belief in the value of productive, knowledge-based industries reinforced by skilled and innovative workers.

By making it part of the Ministry of Economic Development and Trade, the Ontario Government reaffirmed its conviction that **Technology Ontario** is an essential player in realizing the province's industrial policy and promoting economic renewal.

And by changing its name from the Ontario Technology Fund, the government clarified **Technology Ontario's** expanded mandate. No longer just a


funding agency, **Technology Ontario** is now more directly responsible for creating, sustaining and leveraging Ontario's R&D capabilities, in close partnership with other public and private sector organizations.

Technology Ontario has broadened its scope to include key industrial sectors, while working to develop strategies for those technologies vital to Ontario's future. This expanded responsibility recognizes **Technology Ontario's** notable track record.

Since its founding in 1986, **Technology Ontario** achieved significant success with the development of new products and services, new patents and licences, new alliances between industry and universities, and new skills for Ontario workers.

In this way, it directly supports the fundamentals of a competitive economy: creating linkages and partnerships, developing new technology, transferring technology, developing skills, supporting and developing home-based companies, and building international capabilities. All of which supports the government's goal of working with its partners in business, labour and communities to renew the economy and put Ontario back to work.

Our thanks for these efforts are extended to our private sector partners, **Technology Ontario** staff, and other provincial agencies involved in technology development and diffusion. In addition, we thank the many exceptional scientific and engineering researchers across the province who are helping to provide Ontario with a more prosperous future.



Peter Barnes
Deputy Minister

A message from

Martin Walmsley, Director

Technology Ontario

Technology Ontario experienced both change and expansion in the past fiscal year. This change and expansion has occurred partly as a result of the successes obtained in the past six years and partly as a result of the reorganization of the Ministry of Economic Development and Trade.

The long awaited review of the Technology Fund by the Premier's Council on Economic Renewal was published under the title Ontario 2002. This review, commended the government for recognizing the Technology Fund as an important investment for the future and urged the government to establish a stable, long-term source of funding. The seven recommendations, specifically related to the operations and mandate of **Technology Ontario**, were accepted by the Ministry of Economic Development and Trade.

During the review captured in Ontario 2002, the Ministry of Economic Development and Trade underwent a major reorganization. The timing made it possible to incorporate many of the recommendations into the revised mandate of **Technology Ontario**, which now comprises the old Technology Fund as well as additional funding to support its broader role.

The mandate of **Technology Ontario** is to:

- ❖ manage the Ministry of Economic Development and Trade's investments in science, technology and engineering
- ❖ be responsible for the strategic development of enabling technology sectors, e.g., computers and software, biotechnology, design engineering, and process engineering (including advanced materials)
- ❖ provide technological support to all Sector Strategy Development teams
- ❖ contribute to the development of intelligence on science and technology and the R&D infrastructure

- ❖ monitor the government's investment in science, technology and engineering related infrastructure
- ❖ manage special projects on demand
- ❖ manage the ministry's activities related to science and technology awareness
- ❖ manage Ontario's international science and technology activities, especially with the Four Motors for Europe

It will take at least until mid-1994 to fully realize this expanded role, especially in a period of declining resources. However, a good start has already been made with the development of the sector strategies. Two will be tabled in fiscal 1993/94.

In fiscal 1992/93, **Technology Ontario** was given responsibility for managing the Ministry's financial contribution to ORTECH International. The Branch has already participated in a major review of the operations of ORTECH International. We now look forward to a close working relationship with this important institution.

In the past, **Technology Ontario** has had only an interest in science and technology awareness as it affected individual programs. It will now be a major challenge to develop a broader approach because of the major initiatives started through the Industry Research Program. In partnership with 20 recipients of funding through this program, TVOntario is preparing five-minute shows on each of the company's activities as they relate to the research project. These segments began airing in February 1994. Eventually, these success stories will be linked to one-hour programs for national distribution. **Technology Ontario** also actively supported an Ontario bid for the International Space University for Ontario.

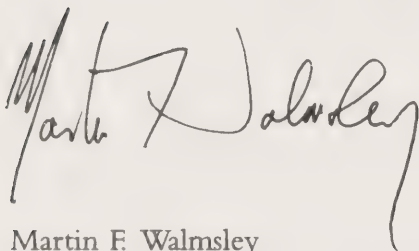
During the year, the government extended the funding for the Centres of Excellence for another five years. A major review of the Centres will take place in fiscal 1994/95, and, if positive, will result in an open competition for renewed funding in 1996. At that time, it is expected that existing Centres and new applicants will compete for funding.

While we were able to re-open the Industry Research Program late in the financial year, cash flow problems caused a one-year hiatus in funding for the

University Research Incentive Fund. It is hoped that all programs will be fully operational by the end of fiscal 1993/94.

We look forward to the future with enthusiasm. While government restraint will have its effect on funding, the importance of science and technology to the economic and social development of the Province has been clearly stated.

In conclusion, I would like to express my gratitude to the staff in the branch. Without their expertise, professionalism and enthusiasm, none of this would have been possible.

A handwritten signature in black ink, reading "Martin F. Walmsley". The signature is written in a cursive style with a large, stylized "M" and "W".

Martin F. Walmsley
Technology Ontario

INTRODUCTION

Technology Ontario represents an investment in Ontario's future. Each year, the value of that investment grows. It grows when home-based companies prosper in new markets, when new technology advances environmental and health care protection, and when technology is transferred to create new job opportunities.

Success, however, is not measured in single events alone. Far more important than any one R&D project are the technical foundations which are laid, the linkages that are formed, and the skills which are strengthened. These are the longer term achievements that deliver prosperity in a globally competitive age.

Once again, the fiscal year 1992/3 provided tangible evidence of Technology Ontario's progress toward a more innovative economy. Its efforts were rewarded by the many scientists, researchers, engineers, graduate students, business people, employees, labour representatives, educators and trainers who participated in Technology Ontario programs.

LINKAGES AND PARTNERSHIPS

Successful new technologies are rarely developed in a vacuum. Their complexity and uniqueness usually demand the type of innovation which best happens when there is input from several diverse sources.

Universities, research labs, industry and government, have a better chance of benefitting from technology when they link their expertise and leverage their resources. Technology's full potential is realized more quickly when knowledge and new ideas are shared.

Technology Ontario works to create the linkages and partnerships which deliver innovation. Through a team approach, Technology Ontario builds the common understanding and collective goals necessary for effective R&D.

Highlights

A number of successful initiatives were carried out that demonstrate the value of creative linkages and partnerships.

- ❖ The Manufacturing Research Corporation of Ontario (MRCO) completed the first stage of an extensive outreach program targeted at small and medium-sized Ontario manufacturers. Designed to define the research and technology requirements of these companies, the program will also introduce them to MRCO's networks and resources, and co-ordinate linkages with university research groups. To date, about 80 companies have been directly contacted, generating a high level of interest. A further 100 companies are now being approached with the offer of specific services and technology resources.
- ❖ The Information Technology Research Centre (ITRC) continued to boost its knowledge about prototypical characters and other shapes which enable recognition. A key project -- *Recognizing Handwritten Characters and Other Deformable Objects* -- uses neural networks to construct three-dimensional models for biomedical applications. This work has led to a new research project in partnership with the Eye Research Institute of Canada and The Toronto Hospital. The project will explore the use of ophthalmic image analysis to aid in the detection of diseases.
- ❖ The Waterloo Centre for Groundwater Research (WCGR) worked closely with farmers and other agricultural representatives to help identify health concerns relating to farm wells. A survey, partly funded by Agriculture Canada, showed that about one-third of the wells tested were affected by coliform bacteria, while a significant number of others contained nitrates from fertilizers. The WCGR study recommended how farmers could improve the location of their wells and their chemical handling to avoid shallow contaminated groundwater. The WCGR is also working in partnership with industry to aid in the detection and cost-effective treatment of environmental contamination at industrial sites. Additional efforts involve exploring ways to reduce contamination at metal mine sites and developing more effective measures for treating septic wastes from individual family dwellings.

- ❖ A partnership between two university research groups (at Carleton and Queen's Universities) and two Ontario companies (both members of TRIO, the Telecommunications Research Institute of Ontario) helped Ontario maintain its world-leading capabilities in satellite communications. SkyWave Electronics of Kanata implemented a new circuit board version of a 4,800 bits per second (bps) speech coder -- first developed by TRIO researchers at Carleton University -- into a number of its products. These products are sold internationally, and allow customers to communicate voice and data through ground stations to geostationary satellites. After SkyWave presented a copy of its new coder to Queen's University, two other initiatives transpired: a lower speed version of the modem was adapted by CAL Corporation of Ottawa for use in satellite mobile earth terminals; and an upgraded system was developed by Queen's TRIO team to provide Doppler correction for mobile systems deployment.
- ❖ The University Research Incentive Fund (URIF) helped to advance linkages between university researchers and Ontario industry. Seventy new projects worth nearly \$11 million were co-funded by 55 corporate partners, who collectively contributed more than \$5 million. To date, URIF has sponsored nearly 700 projects involving more than 300 corporate partners. The total value of this research is about \$150 million, of which industry has funded about half.
- ❖ The Canadian Semiconductor Design Association and the Industry Research Program (IRP) resulted in a number of successes during the year. In the case of Mitel Corporation, the IRP supported the development of a new family of digital telephone components, a digital crosspoint data-switch, and a low-power voice compression chip. These components were developed at one-quarter the cost, and one-third the time.
- ❖ In late 1992, the existing four international projects with Rhône-Alpes underwent an in-depth review. The projects were all successful examples of research collaboration between Ontario and Rhône-Alpes. One patent has been applied for as a result of the Fly Ash project, and product is already on the market as a result of the collaborative agreement between ISG Technologies and INSA, Lyon-Villeurbanne. In some cases (for example, in

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biomaterials) the collaborative research is continuing with funding from other sources. Three new projects in the fields of microelectronic materials, optoelectronics and manufacturing systems were approved at the same meeting.

The projects with Baden-Württemberg were also reviewed in this fiscal year. The project to develop a solid state diode pumped laser was extended by one year to allow a prototype to be built and tested. Preliminary discussions on the possibility of a four-year research agreement were initiated between Ontario's Information Technology Research Centre and the Forschungsinstitut für Anwendungsorientierte Wissensverarbeitung (FAW) on the campus of the University of Ulm.

The strategic plan for the Four Motors/Ontario Telepresence project was approved by the leaders of the five regions in February 1993. Exchanges of researchers have already taken place, and a Technology/Methodology Inventory has been prepared and issued for hardware, software, system prototypes and methodologies that have arisen from the Ontario component of the project.

NEW TECHNOLOGY


Today, new technologies help drive economic growth. Ontario has both the ideas and the innovation for the development of technology. What is required is increased support and expanded opportunities.

Through funding, training, and promotion of new strategic alliances, Technology Ontario established the processes and programs that Ontario needs for technology development. By providing access to financing and encouraging new research initiatives, Technology Ontario is working to create a culture of continuous innovation.

Highlights

Fiscal year 1992/93 witnessed several breakthroughs in the area of new technology development.

- ❖ The Ontario Centres of Excellence continued to produce an impressive number of new patents and technical licences. Forty-eight patents and 51 technical licences resulted from the program. In addition, private sector companies contributed close to \$20 million to the centres program during the year.
- ❖ At the Manufacturing Research Corporation of Ontario (MRCO), work proceeded on the development of new computer software to boost efficiency and effectiveness in plastics design. The software will eliminate the conventional "trial and error" approach to designing plastics fabrication equipment. The die for the equipment is designed on a computer, eliminating the need to cut a steel prototype first to determine if the design works in production.
- ❖ Under the Industry Research Program, Inco Ltd. continued to explore the use of high density tailings as mine backfill. This project calls for the design, development and testing of a new type of high density backfill system for use in underground mines. Inco Ltd. is also working to develop the systems and technologies necessary for transporting concrete-type mixtures over long horizontal distances and to depths of more than 1,000 feet. As well as increasing operating efficiencies and safety, the project will have a positive environmental impact since mine tailings will be used as backfill. Initial research is promising and detailed engineering is now underway.
- ❖ Under the Industry Research Program, the Canadian agricultural division of multinational Ciba-Geigy examined new ways to control spruce budworm. As part of an international program, the company is determining the commercial potential of *Trichogramma* (tiny, indigenous parasitic wasps) as a biological control to replace the use of chemicals in pest control. In addition to the engineering design expertise offered by Ciba-Geigy Canada, the Universities of Guelph and Toronto, the Ontario Ministry of Natural Resources and the Canadian Forestry Service are involved in the project. Any patents arising from the work will be held jointly by the company and the two universities.

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- ❖ Ultra Lasertech Inc. (ULI) of Mississauga continued to develop a new portable laser for use in medical and industrial applications. As well as employing a unique technology based upon sealed carbon dioxide lasers, ULI is now marketing a unique spin-off product developed under the Industry Research Program. The opportunity evolved when ULI hired a specialist to find a power supply unit to meet the exacting specification for its portable CO₂ laser. Known as Power Supply, it has now become a viable product exceeding its original use.
 - ❖ Royal Plastics, with the assistance of the Industry Research Program, developed a new housing system which is to be marketed in China, Mexico, South America and Europe. The system utilizes a superior form of extruded, reinforced polyvinyl chloride polymer components, with characteristics which surpass those of conventional building materials. The Royal system of interlocking wall and roof panels creates a sheltered living environment appropriate for all types of climate conditions ranging from extreme heat to extreme cold.

TECHNOLOGY TRANSFER

Technology transfer is vital if Ontario industry is to bring new products and services to market and compete in the global economy. The very best ideas and the most innovative initiatives risk being lost if they languish too long in the lab, or cannot be commercialized.

Technology Ontario recognizes the imperative of making technology transfer simpler, faster and easier. By encouraging entrepreneurship, aiding the placement of graduate students within industry, providing funding of key projects and fostering partnerships, it is moving key science and engineering advancements from the laboratory to the marketplace.

Highlights

Important new technology arrived in the commercial marketplace during fiscal 1992/93, assisted by the diffusion and transfer activities of Technology Ontario.

- ❖ A new image processing software package named SAIL (Space & Atmospheric Imaging Lexicon) was officially launched by the Institute for Space and Terrestrial Science (ISTS). The software is the first commercial product to be developed by the ISTS Space Astrophysics Laboratory, and is now available to the astronomy community world-wide. Image processing technology is used to support scientific study of missions to outer planets. SAIL, which operates in a PC environment, uses a powerful data processing language to process ground and space-based images from a variety of different data sources. In addition to providing scientists with a powerful tool for visualizing, combining and comparing various image processing data, the SAIL software has significant potential for Earth remote sensing work.
- ❖ Carleton University scientists, working for the Telecommunications Research Institute of Ontario (TRIO), upgraded their eight kilobits per second (Kb/s) speech coder which they originally developed four years ago. The new four Kb/s speech coder is an enhanced, faster version, with a new algorithm that provides a migration path to increased capacity. Advances in speech coding technology, which is used in digital telephony, have already contributed to significant economic opportunities. For example, Newbridge Networks of Kanata incorporated the eight Kb/s version as an important feature of its MainStreet product line. This line has already recorded sales of several hundred million dollars. Newbridge, together with SkyWave Electronics of Kanata and several other TRIO members, has now expressed interest in the enhanced four Kb/s version, which has applications for many organizations currently using existing voice compression technology.
- ❖ ElectroPhotonics Corporation (EPC) of Toronto, a new space technology spin-off company backed by three Centres of Excellence, applied space research to an Alberta construction project. The company embedded a fiber optics sensing system in the Beddington Bridge, located in Calgary. The system incorporates state-of-the-art fiber optics technology to monitor and

measure stress in the bridge, which uses a new type of pre-stressed cables embedded in concrete girders. It is the first time in the world that fibre optics sensing has been used in this type of application. This system has the potential to influence national transportation policy and operation, and may have application in a wide range of fields, from monitoring structural deterioration in large buildings to assessing stress on artificial limbs.

- ❖ The Ontario Laser and Lightwave Research Centre continued to help companies launch new technologies and develop marketable products. Two examples during the year included: the development of a prototype for Mytec Inc. of Toronto, of a patented optical fingerprint access control device which verifies identity; and the development, for the DeHavilland Division of Bombardier Inc., of a pressure-sensitive paint that increases aviation safety.
- ❖ The Ontario Centres of Excellence made a major contribution to the transfer of graduate students to industry. Close to 2,300 graduate students were involved in Centres of Excellence projects — the highest participation since the Centres were created in 1988. As well as working in close contact with the best researchers in their field, the students' time at the Centres also led to new career opportunities. Of the 596 students who left the Centres of Excellence during the year, 369 joined Canadian firms, with 284 accepting company positions within Ontario. Another 146 students returned to university to advance their research.
- ❖ The Industry Research Program continued to generate new commercial sales for Ontario companies. IRP is currently working with business partners to develop and support 23 research projects. To date, program grants totalling \$137 million have leveraged almost \$312 million worth of research. Even at this early stage in most of these projects, IRP-supported initiatives have generated sales of nearly \$210 million, with about 80% from exports.

SKILLS DEVELOPMENT

Technology Ontario's success at helping companies work smarter, and Ontario's economy grow faster, is built on people. Their skills, strengths and ability to adapt to new technology will determine Ontario's economic future.

Workers need to upgrade their technical capabilities to feel secure about technology's role in the workplace. Companies need access to a skilled labour pool of scientists, engineers and technical personnel to compete in the global economy. Technology Ontario works to support both objectives.

By placing a high priority on the concerns of people when dealing with issues of technology, Technology Ontario is helping create a skilled workforce suited to tomorrow's workplace.

Highlights

Technology Ontario supported several initiatives which advanced the province's technical capabilities and people's understanding about the role and impact of new technology.

- ❖ The Technical Personnel Program (TPP) continued to assist Ontario businesses in their hiring of technical and scientific personnel. During this period, 196 employee applications were approved, bringing the total to 711 approved placements since the program's creation in late 1989. Three-quarters of the participating companies have 50 or less employees, while two-thirds have \$5 million or less in annual sales. The majority, 90%, are manufacturing companies, with the remainder in the service sector. Capital research and development costs for TPP projects, paid for by participant companies, are expected to yield an 18 to 1 return on TPP funding.
- ❖ Fabrene Inc., a northern Ontario company which manufactures polyolefin fabrics for industrial packaging and building materials, was one company that benefitted from the TPP. Under the program, the company hired an electrical engineer to modernize operating equipment through new sophisticated looms and computer-based process control systems. These changes improved flexibility, productivity and product quality, strengthening Fabrene's position in the export market and introducing its products to new niche markets. The company also hired a technical resource person. This led to several successful R&D ventures being undertaken, resulting in new product development.

- ❖ The Ontario Centre for Materials Research (OCMR) used its wide-ranging resource network to boost the expertise of Resource Plastics of Brantford. Resource Plastics is one of North America's largest plastics recyclers, specializing in recycling products such as milk jugs and shopping bags. The company achieved its leading position in the industry in the past five years, through in-house development of processes and by extensively characterizing the quality of the recycled materials which it sells. To build this expertise, Resource Plastics drew upon the knowledge and experience of OCMR academic members studying areas as diverse as film extrusion, print ink in the plastics waste stream, comparisons of recycled and virgin plastics, and plastic blends.
- ❖ The OCMR also worked jointly with another Centre of Excellence, the Manufacturing Research Corporation of Ontario, to produce a resource book for high school teachers. *From the Lab to the Marketplace: Battery Technology*, teaches students how innovation leads to new products. Distributed to all Ontario high schools, the book is now being circulated throughout Canada on a CD-Rom format by Industry, Science and Technology Canada.
- ❖ The Technology Adjustment Research Program (TARP) completed several projects to help workers better adjust to the demands and challenges of new technology. These included:
 - ❖ development by the Canadian Auto Workers (CAW) of a week-long course dealing with the occupational safety, skill, and employment implication of new technology. This course is now being delivered to members of CAW's workplace technology committees.
 - ❖ analysis by the Communications, Energy and Paperworkers of Canada (CEP) of skill needs and workers' perceptions of training. The CEP also developed courses for union members which allow them to learn negotiating skills and increase understanding of new forms of work organization.
 - ❖ completion by the International Ladies Garment Workers Union (ILGWU) of the first phase of a project documenting the effects of home-based production work. The second phase of the project -- examining the scope for the garment industry's modernization through electronic data interchange (EDI) technology -- is nearing completion.

- ❖ completion by the International Association of Machinists (IAM) of a project assessing the supply and demand for skilled machinists. The project examined the implications for machinists of the hiring of more engineers and technologists, and the training requirements which result from the introduction of computer-assisted equipment to the shop floor.
- ❖ completion of a survey by the Metro Labour Education & Skills Training Centre of the experience of permanently laid-off industrial workers with labour adjustment programs. The project examined gaps in basic skills and found a significant demand for training beyond what is currently offered.
- ❖ completion by the United Food and Commercial Workers (UFCW) of a project which focused on technological change and the implication of new skill requirements in the poultry and meat processing industry. The results of the study will shape the union's efforts to establish a joint labour-management training initiative for the industry.

HOME-BASED COMPANIES

Ontario's competitive advantage begins at home. It is rooted in the innovation, creativity and management skills of Ontario companies and their employees.

For the province to prosper internationally, Technology Ontario must ensure that essential resources and support structures are in place. This helps to encourage the start-up of new companies based in Ontario and to strengthen the technical and R&D development of those already here.

By encouraging innovative product development and by introducing new skills and expertise into companies, Technology Ontario is expanding the pool of technical excellence. In so doing, it is helping to spread the benefits of economic growth and prosperity.

Highlights

Technology Ontario programs worked to strengthen a number of Ontario companies and paved the way for new opportunities in 1992/93.

- ❖ The Information Technology Research Centre (ITRC) helped launch a new spin-off company through research into parallel computing. Platform Computing has licensed software from ITRC's parallel computing project to support parallel application on workstation clusters. The new company provides load balancing software for networks of heterogeneous companies.
- ❖ Quadro Engineering Incorporated of Waterloo diversified its product line and strengthened its operations with assistance from the Technical Personnel Program (TPP). The company develops, designs and manufactures specialty stainless steel processing equipment for the food, pharmaceutical, chemical and cosmetic industries. Quadro was able to hire a technical research specialist under TPP. The specialist aided in the testing, start-up, and configuration of a new line of liquid mixing equipment. As a result, a new product line within a similar established market was added. TPP also allowed Quadro to hire its first Industrial Engineer. This individual implemented numerous incremental changes leading to higher productivity, repeatability of manufacture, reduced scrap and improved product quality.
- ❖ Iafate Machine Works of Thorold strengthened its expertise under TPP. This company supplies and produces high quality, custom-machined tool and die and components for a variety of manufacturing industries. Iafate wanted to expand its customer base to include those industries which demand more advanced production control and quality systems. TPP funding permitted the company to hire a Plant Manufacturing Engineer and a Quality Assurance Manager. This greatly improved manufacturing and other capabilities, allowing Iafate to offer internationally accepted quality assurance standards. The company has recently been awarded certification from several large automotive manufacturers.
- ❖ Applied Silicon Inc. Canada, a consulting services and product development company based in Ottawa, gained a new product line and new export opportunities due to TPP. From its work in hardware and software development projects for government departments, the company developed some promising product spin-offs. Applied Silicon was able to hire an engineer with the experience to oversee introduction of new products into operations. A new product line, based on custom image processing, is now being manufactured and the company began to export to the U.S. and other countries.

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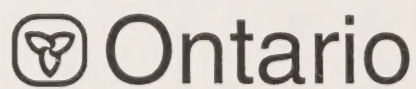
Ministry of Economic Development and Trade

Technology Ontario Cashflow

Program	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	Total
Centres of Excellence		13,627,932	41,086,206	41,787,818	38,209,254	40,837,410	38,490,483	214,039,103
Industry Research Program			10,366,566	20,708,775	23,743,520	21,333,974	19,912,829	96,065,664
URIF	1,653,728	6,247,029	9,012,303	8,000,000	7,597,379	6,744,741	5,552,112	44,807,292
Baden-Württemberg				115,200	561,527	579,410	388,809	1,644,946
Rhône-Alpes					183,542	511,257	633,337	1,328,136
Technology Adjustment Research Program					757,288	845,543	670,367	2,273,198
Centres of Entrepreneurship		225,000	900,000	900,000	900,000	900,000	0	3,825,000
Technical Personnel Program				324,978	2,614,970	4,583,125	6,091,594	13,614,667
Radarsat					4,967,328	5,000,000	7,999,993	17,967,321
Telepresence Project						389,473	769,529	1,159,002
MEDT Total	1,653,728	20,099,961	61,365,075	71,836,771	79,534,808	81,724,933	80,509,053	396,724,329
R&D Super Allowance*			32,000,000	48,000,000	50,000,000	50,000,000	0	180,000,000
Technology Ontario Total	1,653,728	20,099,961	93,365,075	119,836,771	129,534,808	131,724,933	80,509,053	576,724,329

★ Estimated

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